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(54) Improvements in or relating to insulators especially for use at radio frequencies

(57) Such insulators are frequently made of ceramic and glazed. Glazes have an affinity for water and readily hold a thin but electrically conducting film on their surface. In conditions of high humidity rain or sea spray these insulators lose much of their performance. It is the purpose of the present invention to impart to ceramic insulators water repellent properties by a thin coating of polytetrafluoroethylene (PTFE). Similarly the external ceramic body of sparking plugs suffers a deterioration of performance in humid conditions and such plugs also perform better when coated with polytetrafluoroethylene on their outer insulating surface. Other applications are exemplified (e.g. an r.f. capacitor (Fig. 6, not shown)).

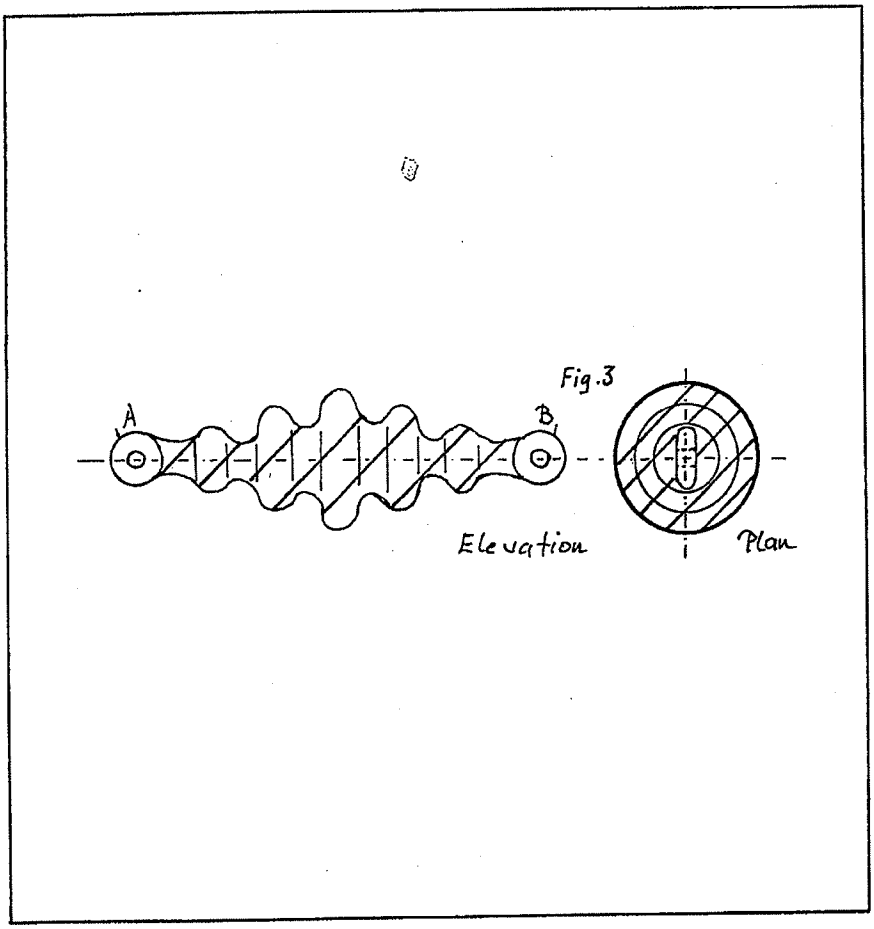

Fig.3

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Fig. 1

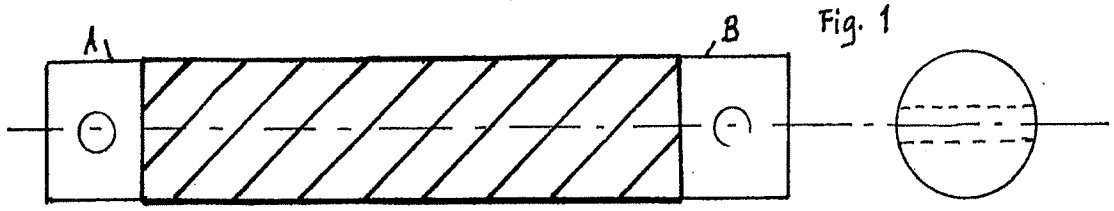


Fig. 2

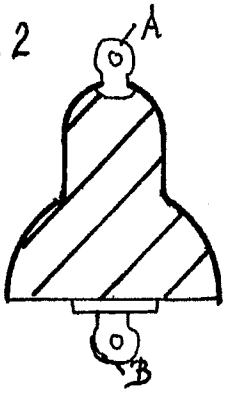


Fig. 2a

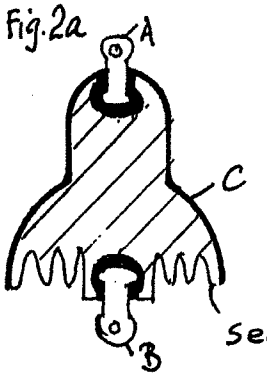
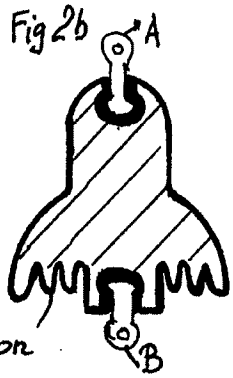
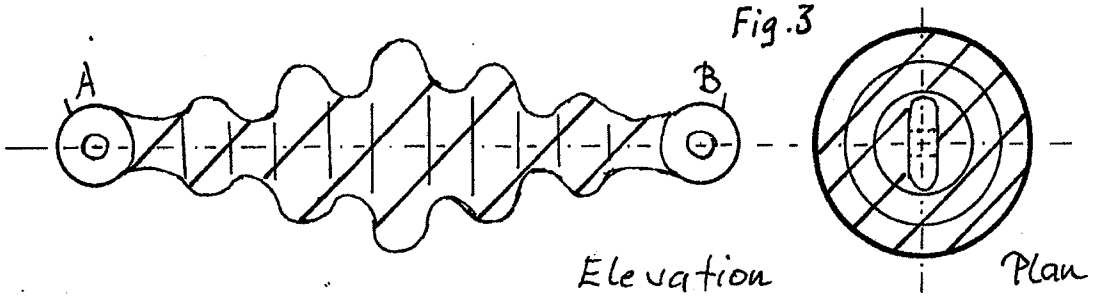


Fig 2b



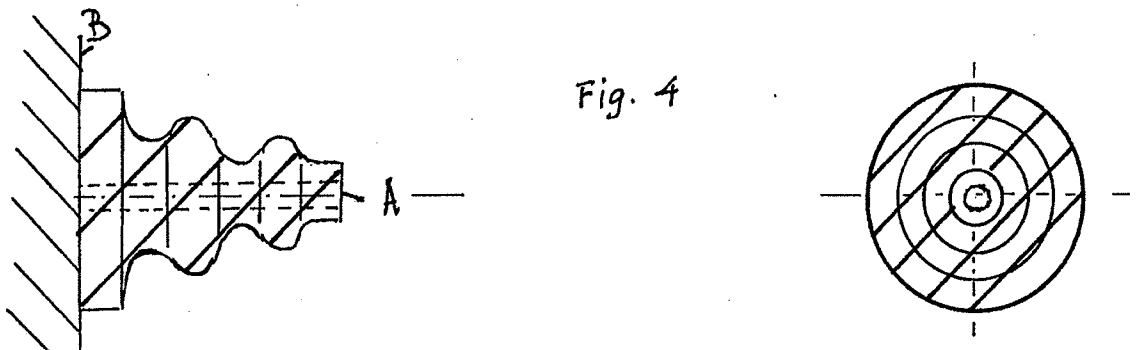
Section

Fig. 3



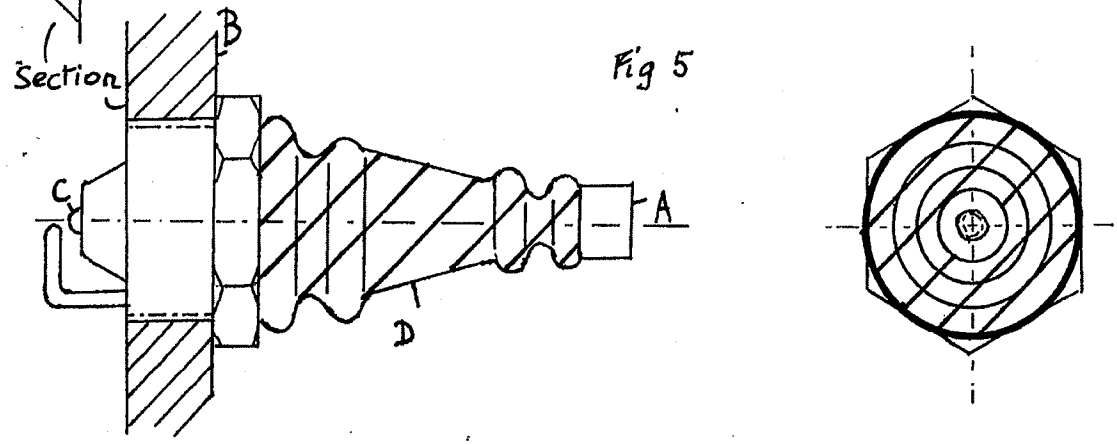
Elevation Plan

Fig. 4



Section

Fig 5



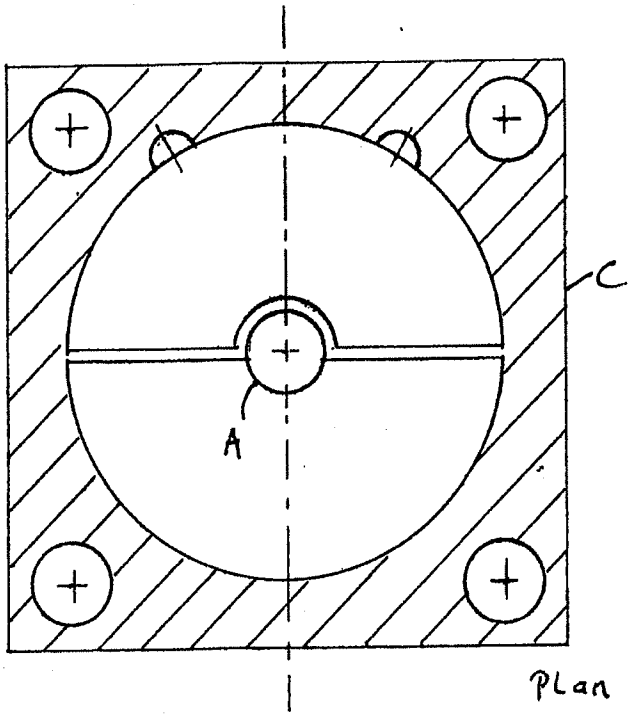
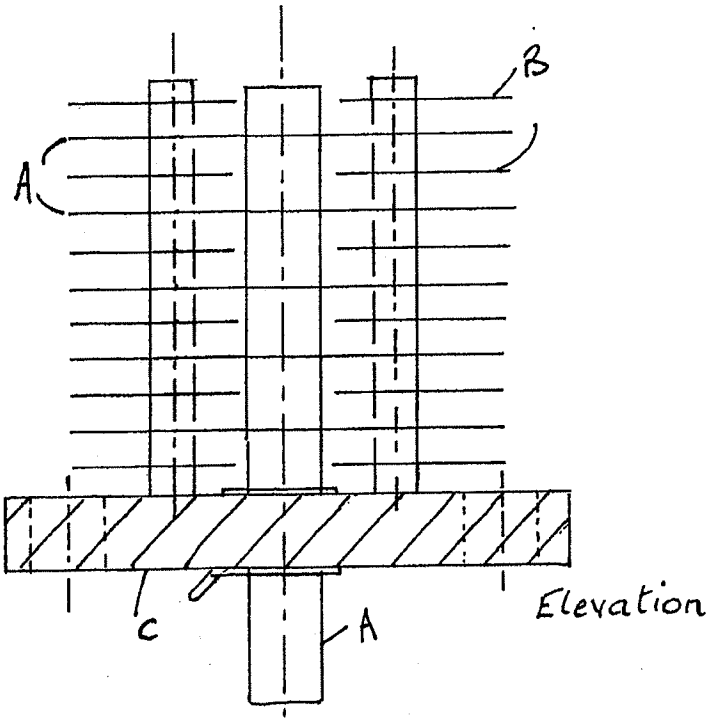


Fig. 6



SPECIFICATION

Improvements in or relating to insulators especially for use at radio frequency

Technical Field.

The invention claimed relates to the electrical insulation of alternating potentials such as are generated by electrical circuits oscillating at frequencies in excess of 10,000 cycles per second or by devices generating high potentials by a rapid rate of change of electrical current in the primary circuit of a transformer, induction coil or Tesla coil, as for example in the ignition circuits of motor vehicles or by rotating machines, in the last case the frequencies being usually less than 10,000 cycles per second.

Background Art.

Insulators for use with alternating potentials as stated above, are commonly made of ceramic such as porcelain or high alumina ceramics or of glass, glass-reinforced plastic or of plastic.

The present invention relates to such insulators as are made of ceramic, such as insulators for use in radio transmitters and receivers, in the insulation of radio antennas, transmission lines, pulse transmitters for echo sounding in the atmosphere or below water, ingition circuits of motor cars in the form of sparking plugs and insulators for passing electrical conductors into and out of sealed containers such as transformer casings.

Insulators made of ceramic are frequently coated with a glaze in order to seal the ceramic surface. When dry, this construction provides excellent insulation. In conditions of high humidity or when the insulator is exposed to rain or sea spray, a highly adherent film of moisture forms on the surface of the ceramic glaze. This aquaeous film conducts electricity especially at high frequencies and thus lowers the quality of insulation provided. Solutions of silicones are sometimes coated onto insulators to break up the conducting aquaeous film, but their effect is not very permanent.

Disclosure.

It is the purpose of the present invention to improve the performance of ceramic insulators in conditions of high humidity or actual wetting by water or aquaeous solutions such as sea water.

The invention is to be accomplished by coating the unglazed ceramic by a film of polytetrafluoroethylene (PTFE) or similar plastic. PTFE is more costly than some ceramics and lacks some of the mechanical properties of ceramics which make it unsuitable for many electrical insulation duties (as cited above) on its own, but it does have the property of being repellent to water and aquaeous solutions, this property being imparted to the ceramic insulator thus coated.

In consequence a ceramic insulator coated with PTFE as described, will continue to function satisfactorily even when subjected to the high humidity of actual wetting.

Description of Figures.

Fig. 1 shows a cylindrical insulator between the ends A and B of which an alternating potential is considered to exist. The shaded portion is coated with a thin layer of polytetrafluroethylene (PTFE) thus providing a water repellent insulation between the ends A and B. Fig. 2 shows a bellshaped insulator with electrodes A and B, which insulator could be used singly or in a chain of similar units, only the upper surface being coated with PTFE as shown by shading in Fig. 2 and by the thick black line C in section Fig. 2a, or the whole outer surface could be coated as indicated in section Fig. 2b. In Fig. 3 the corrugated surface of the insulator is coated with PTFE and similarly in Fig. 4, where the section B represents a conducting surface, the other shading in these last Figures representing the coating of PTFE. Fig. 5 shows a sparkling plug, the surface B in this case being the metal body of the engine and the point A the external connector to the central (high potential electrode C. The shaded portion D represents the ceramic body outside the engine, coated with PTFE. Fig. 6 shows a radio frequency capacitor, the shaft and vanes A being at a different potential to the plates B, which are insulated from one another by ceramic plate C, the latter being coated with PTFE as shown by the shading.

Carrying out the Invention.

In order to carry out the invention, insulators of ceramic are prepared in the traditional manner, but the step in which a glaze is applied is omitted or when a glaze exists on an already fabricated insulator, such glaze is removed by grit blasting. Thereafter a solution of polyether sulphone in a mixed solvent system together with polytetrafluoroethylene and pigments if required after stirring and sieving is sprayed onto the ceramic surface. The wet coating is heated to 70° C rising to 150° C to remove volatile solvents and then cured at between 280° C — 440° C for several minutes.

Utilization.

Insulators made in accordance with the preceding description are capable of being used for radio frequency aerial systems on land at sea and in the air and will perform in adverse weather conditions.

Such insulators can be incorporated in wireless telegraphy and telephone apparatus in facsimile and television transmitters and receivers to improve the performance under adverse weather conditions or in tropical climates of high humidity.

Sparking plugs as in Fig. 5 will maintain their performance under conditions of high humidity permitting ready starting of cold internal combustion engines in fog or sea spray.

CLAIMS:

1. Electrical insulators for use with alternating potentials normally above 10,000 cylces per second and constructed of ceramic, porcelain or

high alumina ceramic and coated over at least a portion of their surface with a coating of polytetrafluorethylene.

2. Electrical insulators as in claim 1 but for use with alternating potentials below 10,000 cylces per second.

3. Electrical insulators as in claim 1 for use with potentials generated by means of transformers, induction coils or Tesla coils where a rapid rate of change of current produces the high potential.

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